Case Report

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A hemodialysis case with fungemia due to *Candida parapsilosis* after COVID-19 infection

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ABSTRACT

Bacterial and fungal infections may emerge with or following COVID-19 infection. Corticosteroids, antibiotics, and other therapies utilized in severe cases of COVID-19 pneumonia may pose a risk for fungal infections. In this paper, we present the case of a 59-year-old female patient with underlying chronic renal failure and diabetes who received long-term corticosteroid therapy for COVID-19 pneumonia and subsequently developed fungemia and catheter infection due to *Candida parapsilosis*. We removed her subclavian catheter and administered amphotericin -B therapy for 37 days. Overall, we recommend keeping in mind that opportunistic fungal infections may emerge in patients receiving long-term immunosuppressive drug therapy due to COVID-19 with risk factors such as hemodialysis, central venous catheter use, and broad-spectrum antibiotic use.

Keywords: COVID-19, *Candida parapsilosis*, catheter infection, fungemia

INTRODUCTION

The prevalence of invasive fungal infections was reported to have increased dramatically following COVID-19 infections caused by the SARS-CoV-2 virus. Immunomodulatory therapies such as systemic corticosteroids and anti-cytokine treatments administered to COVID-19 patients are prominent risk factors for invasive fungal infections. In addition, lymphopenia, which often emerges in severe cases of COVID-19, is among the predisposing factors for fungal infections. The present paper reports catheter infection and fungemia due to *Candida parapsilosis* in a 59-year-old female patient who was hospitalized in the intensive care unit (ICU) with the diagnosis of COVID-19 pneumonia, received prednisolone treatment for 20 days, and underwent hemodialysis through a subclavian catheter.

CASE

A 59-year-old female patient applied to the emergency department with complaints of low back pain, difficulty walking, and shortness of breath for 2 weeks. She had a history of hypertension, diabetes mellitus, coronary artery disease, and ischemic attack and was undergoing hemodialysis three times a week through a right subclavian catheter due to chronic kidney failure. In addition, she had been hospitalized in the ICU following a diagnosis of COVID-19 pneumonia 1 month previously and received prednisolone treatment for 20 days.

Her initial physical examination yielded the following findings: temperature of 36.6 °C, heart rate of 75/min, blood pressure of 149/81 mmHg, and oxygen saturation (SpO2) of 93%. Her general condition was moderate, and she was conscious and oriented. She had tenderness on palpation in the lumbar region. Other system examinations resulted in normal findings. Laboratory tests revealed a leukocyte count of 8200/mm³ (reference range: 4000-10,500/mm³), C-reactive protein of 186 mg/L (ref.: 0-5 mg/L), AST of 64 U/L, ALT of 35 U/L, creatinine of 4.33 mg/dL, and glomerular filtration rate of 10 mL/min/1.73 m². The results of thorax computed tomography performed in the emergency department were reported as follows: "Subpleural -peripherally -located focal consolidation and infiltrating areas of ground- glass density are observed in the anterior and posterior segment of the right lung's upper lobe. Thus, the patient is suspicious for COVID-19 pneumonia." However, the result of the COVID-19 polymerase chain reaction testing of a nasopharynx swab sample taken at admission was negative. Laboratory results of patients before and after hospitalization are shown in **Table**.

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Table. Laboratory results of patients before and after hospitalization

Laboratory findings	White blood cell	CRP	Cre	eGFR	AST	ALT
Before hospitalization	8200/mm³	186 mg/L	4.33	10	64	35
After hospitalization	6120/mm³	246 mg/L	1,5	36	2	1

The patient was admitted to the infectious diseases ward with a preliminary diagnosis of lobar pneumonia, and blood and catheter cultures were taken during hospitalization. We then started empirical intravenous piperacillin-tazobactam at 3×2.25 g and azithromycin at 1×500 mg (oral tablet form) for lobar pneumonia. Despite having no fever, the patient's low back pain continued during follow-up. The blood and catheter culture results were reported as *C. parapsilosis*, found to be sensitive to caspofungin, fluconazole, micafungin, voriconazole, flucytosine, and amphotericin B. Therefore, intravenous fluconazole at 800 mg (2×400 mg) was added to her therapy. We then removed the subclavian venous catheter and inserted a left femoral catheter. Blood cultures were taken every 48 hours to identify the therapy duration for candidemia. Due to the persistent growth of *C. parapsilosis* in blood culture, fluconazole was discontinued on the 11th day and intravenous liposomal amphotericin B treatment at 5 mg/kg/day was started instead. We could not detect vegetation in transthoracic or transesophageal echocardiograms for metastatic focus investigation. Moreover, no pathology was detected by abdominal ultrasonography. Lumbar magnetic resonance imaging (MRI) was performed due to the persisting low back pain with results as follows: "Degenerative signal loss is observed in T2-weighted images of lumbar discs. Moreover, there are signal changes in hypointense T1-weighted images and hyperintense T2-weighted images starting from the L3-L4 vertebral endplates and contrast enhancement after gadolinium injection. A loss of intervertebral disc height at this level and enhancement at the disc level are also noted. Moreover, contrast enhancement in soft tissue is noted in the paravertebral-epidural area. Defined inflammation and enhancement extend to both psoas muscles. Small circumferential contrasting abscess formations are recorded in the left psoas muscle (**Figure 1**).

There are also circumferential contrasting formations of small abscesses in the paravertebral area on the right. Also, an atypical abscess collection is observed in the anterior disc at this level." (**Figure 2**).

Piperacillin-tazobactam was discontinued on the 13th day due to elevated transaminase. Intravenous meropenem (1×500 mg) was started and administered for 28 days. Interventional radiology was consulted for drainage of the patient's psoas abscess, but it was not found suitable for sampling or drainage due to its small dimensions. After determining no growth in blood cultures on the 12th day of amphotericin B treatment and the 23rd day of total antifungal treatment, we discontinued the intravenous amphotericin B after 14 additional days of administration. Control MRI for spondylodiscitis yielded the following results: "Spondylodiscitis findings persist yet show mild regression. Edematous signal increase and mild contrast enhancement in the psoas muscle have not changed."

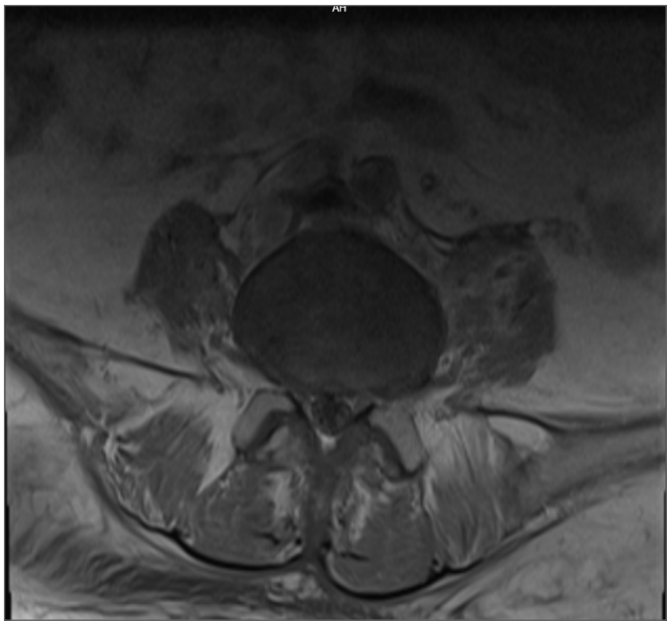

Figure 1. Small circumferential contrasting abscess formations in the left psoas muscle on lumbar MRI

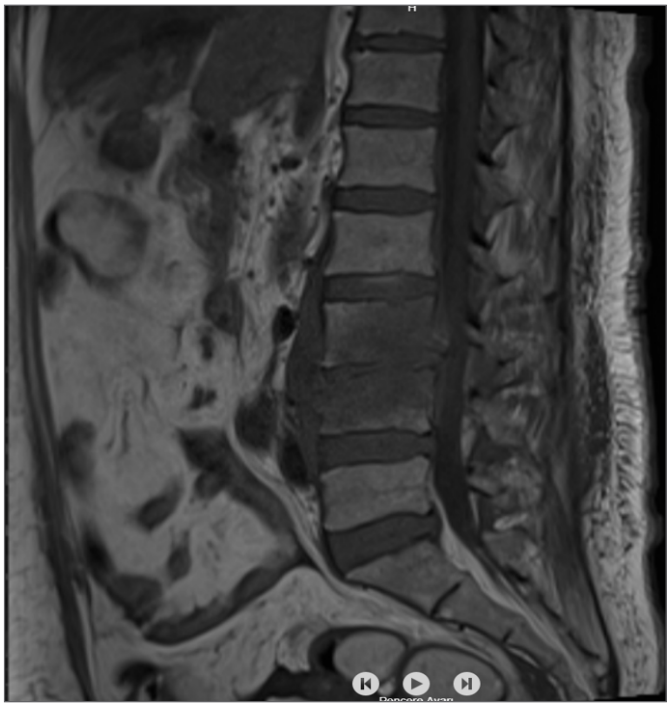

Figure 2. Abscess disc space at L3-L4 on lumbar MRI

Edematous increments in the posterior paravertebral muscle planes were reported to show "slight regression" in the final examination. On the 49th day of intravenous meropenem therapy, the patient was discharged with the recommendation to return for a follow-up visit after 2 weeks and she was prescribed amoxicillin/clavulanic acid at 1×500 mg in tablet form.

DISCUSSION

Opportunistic bacterial and fungal infections are likely to emerge with or after COVID-19 infection (1). Previous studies reported the prevalence of invasive fungal infections in COVID-19 patients to be between 4% and 28%.[1-3]

Lymphocytopenia, hospitalization in the ICU, the use of broad-spectrum antibiotics or corticosteroids, intubation, cytokine storms, and underlying immunosuppressive conditions have been routinely determined as risk factors for fungal infections in patients with COVID-19.[2,3] Opportunistic fungal infections are a significant cause of mortality and morbidity, particularly among COVID-19 patients hospitalized in the ICU.

The genus *Candida* constitutes the fourth most common group of pathogens among bloodstream infections in ICUs around the world. Although *C. albicans* is the most common cause of candidemia in ICU patients, recent epidemiological data reflect an increased incidence of candidemia associated with non-*C. albicans* infections.[4]

Candidemia is a prominent hospital-acquired infection due to high mortality rates, increased length of hospital stay, and high hospital costs. Many risk factors associated with the development of invasive candidiasis, and most commonly with candidemia, have been identified including the use of broad-spectrum antibiotics, the presence or long-term use of central venous catheters and other invasive devices, mechanical ventilation, total parenteral nutrition, hematological and solid organ malignancies, organ transplantation, neutropenia, acute renal failure, prior fungal colonization, immunosuppressive therapies (e.g., corticosteroids and chemotherapeutic drugs), hospitalization in the ICU, and complicated surgical interventions.[5-7]

C. parapsilosis, which has the ability to form a biofilm, is the most commonly encountered *Candida* species in patients with central venous catheter-related candidemia. The development of a biofilm layer in medical devices such as central venous catheters may lead to resistance to antifungal drugs.[5]

A study conducted with COVID-19 patients hospitalized in the ICU after developing fungal infections concluded the most common *Candida* species isolated from clinical samples and blood cultures to be *C. tropicalis* and *C. parapsilosis*, respectively. In the same study, the most common *Candida* species isolated from urine culture was reported to be *C. albicans*.[8]

Our patient had predisposing factors for candidemia, such as hospitalization in the ICU, central venous catheter use, hemodialysis, broad-spectrum antibiotics use, and corticosteroid use due to COVID-19 pneumonia. Although we did not assume that the psoas abscess detected on imaging was also associated with *C. parapsilosis*, we could not determine its exact source because we did not perform sampling. Moreover, we detected no vegetation in transthoracic or transesophageal echocardiograms performed for endocarditis due to *C. parapsilosis*.

In their study investigating fungal infectious agents in COVID-19 patients, Calvo et al.[1] reported infection due to *Candida* spp. in 14.4% of COVID-19-positive patients. This rate was higher than the value previously reported (4%) for patients affected by other viral types of pneumonia. In the same study, the most frequently isolated *Candida* species, mostly from bronchoalveolar lavage samples, was *C. albicans*, followed by *C. parapsilosis*. Moreover, these researchers described more severe pneumonia and radiologically widespread involvement in patients with *Candida* and found that infections due to *Candida* spp. were more common than those due to *Aspergillus* spp. in patients receiving corticosteroids. It is well known that secondary bloodstream infections are a significant cause of mortality and morbidity in patients with severe COVID-19. In this regard, it was previously stated that the presence of a central venous catheter is a risk factor for secondary bloodstream infections in COVID-19 patients.[9]

There was a dramatic spike in the incidence of candidemia and *C. parapsilosis* bloodstream infections with the start of the COVID-19 pandemic. ICU admission, mechanical ventilation, parenteral nutrition, and corticosteroid administration were reported more frequently among patients with candidemia presenting due to COVID-19. Martinez et al.[10] found fluconazole-resistant *C. parapsilosis* in 15 patients, and the incidence of fluconazole-resistant *C. parapsilosis* was found to be 1.34% in patients admitted due to COVID-19 compared to 0.16% among all other patients. Moreover, the rates of ICU admission, previous *Candida* spp. colonization, arterial catheter use, parenteral nutrition, and hemodialysis treatment were found to be significantly higher among those with *C. parapsilosis* infections.

CONCLUSION

Overall, we recommend keeping in mind that opportunistic fungal infections can be observed in patients receiving long-term immunosuppressive drug therapy due to COVID-19 in the presence of risk factors such as hemodialysis, central venous catheter use, and broad-spectrum antibiotic use.

ETHICAL DECLARATIONS

Informed Consent: All patients signed the free and informed consent form.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

Financial Disclosure: The authors declared that this study has received no financial support.

Author Contributions: All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

REFERENCES

1. Calvo GS, Araújo GRS, Pastor EL, et al. *Candida* spp. co-infection in COVID-19 patients with severe pneumonia: Prevalence study and associated risk factors. *Respir Med.* 2021;188:106619. doi:10.1016/j.rmed.2021.106619.
2. Chen N, Zhou M, Dong X, et al. Epidemiological and clinical characteristics of 99 cases of 2019 novel Coronavirus pneumonia in Wuhan, China:a descriptive study. *Lancet.* 2020;395:507–513. doi:10.1016/S0140-6736(20)30211-7.
3. Ye Q, Wang B, Mao J. The pathogenesis and treatment of the "Cytokine Storm" in COVID-19. *J Infect.* 2020;80:607–613. doi:10.1016/j.jinf.2020.03.037.
4. Zuo XS Liu Y, Cai X, Zhan L, Hu K. Association of different *Candida* species with catheter-related candidemia, and the potential antifungal treatments against their adhesion properties and biofilm-forming capabilities. *J Clin Lab Anal.* 2021;35(4):e23738. doi:10.1002/jcla.23738
5. Yamin DH, Husin A, Harun A. Risk factors of *Candida parapsilosis* catheter-related bloodstream infection. *Front Public Health.* 2021;9:631865. doi.org/10.3389/fpubh.2021.631865.
6. Kayaaslan B, Kalem AK, Asilturk D, et al. Incidence and risk factors for COVID-19 associated candidemia (CAC) in ICU patients. *Mycoses.* 2022;65(5):508–516.
7. Liu F, Zhong L, Zhou F, et al. Clinical features, strain distribution, antifungal resistance and prognosis of patients with non-albicans candidemia: a retrospective observational study. *Infect Drug Resist.* 2021;14:3233–3246.
8. CoşkunAS, Durmaz ŞÖ. Fungal infections in COVID-19 intensive care patients. *Pol J Microbiol.* 2021;70(3):395-400.
9. Zhang J, Lan P, Yi J, et al. Secondary bloodstream infection in critically ill patients with COVID-19. *J Int Med Res.* .2021 ;49(12):3000605211062783. doi:10.1177/03000605211062783.
10. Martínez AR, Pascual IP, Guinea J, et al. Impact of the COVID-19 pandemic on the clinical profile of candidemia and the incidence of fungemia due to fluconazole-resistant *Candida parapsilosis. J Fungi (Basel)* 2022;8(5):451. doi:10.3390/jof8050451.